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Enclosed with Feb. 1922
Bee World as supplement.

ational Bee-Keeping

and the

Prevention of Acarine Disease.



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CHESHIRE.

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RATIONAL BEE-KEEPING.

Prior to the epidemic of Acarine Disease in 1906, the most popular strain of bee in this Country was the British Black or so-called Native bee. Owing to the low disease resistancy of this strain, and to the fact that apiaries of these bees act as centres from which the disease radiates, it is rapidly being replaced by the more vigorous and prolific Italian strains.

After many years of experiment, with various races from different parts of the globe, the Italian strains have been selected as shewing the greatest resistance to the disease, and though not truly immune, are not liable to serious infection when managed under Rational conditions. In the cases where bees of these strains become infected, the cause of the infection is generally traceable to the use of irrational methods of bee-keeping.

With these strains it is usually possible to eradicate disease when this is detected in the earlier stages, this being an advantage over the Native strains, which are not amenable to treatment, even in the initial stages of the complaint.

As honey getters the Italian strains are superior to all others, and have been selected for this characteristic by the American Bee-keepers—the largest honey producers in the world.

Queens of these strains are very large, golden in color, and exceptionally prolific, building up stocks from nuclei in a very short time.

The strains selected work well in sections, capping these white, and owing to their extremely gentle character, it is possible to handle strong stocks of these bees under all conditions of weather, and therefore to adopt manipulative measures which ensure absolute freedom from swarming.

During 1921 several stocks which were supplied on four frames in May built up to 20 frames and yielded 180 lbs. per stock by mid July.

Other stocks, wintered on six or seven frames, built up so rapidly that nuclei were taken from them and each stock (spring count) yielded 200 lbs. of honey by July 9th, and gave three nuclei which were on 10 frames and working in the supers at this date.

A large number of Queens have been imported from the United States, and these have been carefully tested for some years.

The strains selected are of remarkably gentle disposition and no stock is allowed in the breeding apiary unless it can be manipulated without the aid of smoker or veil during the working season. As the whole of the surrounding district has been re-queened with the selected strain, purity of mating can be guaranteed for 1922, and any queen producing vicious bees, or showing incorrect mating will be replaced.

For 1922 the selected drone parents are queens of the Ben Davis American five-banded golden strain. This strain is exceptionally beautiful, and very active in foraging: the queens are exceptionally large and very prolific, breeding earlier and later in the season than those of most of the strains examined. This is a very important factor to be considered in the building up of a strain resistant to Acarine disease.

Four Queen parents have been selected for 1922 and queens can be supplied from any of these, if orders are placed in advance. These breeding queens have been selected for temper, prolificacy, working qualities and size, and are probably the finest, in these respects, it is possible to find in Europe.

Breeding Queen No. 1, selected for the carrying on of the strain, was raised in 1921 from a John M. Davis American three-banded golden queen imported from the U. S. A., and crossed with a drone of Pure Penna strain imported from Italy. The young queens of this cross of

two unrelated strains of pure Italians are of a bright golden color, extremely large, very vigorous and prolific, and very much superior in all respects to queens of either parent strain.

Breeding Queen No. 2. is an imported queen from Italy selected by Signor Penna as a breeding queen. This is one of the finest pure Italians obtainable and produces very large and prolific queens of a dark brownish golden color.

Breeding Queen No. 3. This is an American three-banded golden queen imported from Jay Smith, of Vincennes, Indiana, one of the greatest queen breeders in the United States.

Bees of this strain are exceptionally good honey producers, working well in sections and capping these even and white. The queens are large, very prolific, and of a bright golden color.

Breeding Queen No. 4. A Ben Davis American five-banded golden queen imported from U. S. A. This queen is not the parent of the queens to be used for drone production in 1922: direct inbreeding will therefore not be practised.

Queens raised from No. 1 Breeder will be available at all times from May 15th to September and will be sent unless definite orders to the contrary are received.

In order to ensure prompt delivery of queens of the other strains orders must be placed well in advance.

All queens are raised under the most ideal conditions, during the honey flow, in the strongest possible 20 to 30 frame stocks under the supersEDURE impulse, the number of queen cells in each stock being strictly limited, in order to produce the finest queens it is possible to obtain. A far larger number could be produced if this method were not adopted, but this would be at the expense of quality. For full details of methods employed see *Bee World*, 1921.

As the greatest care is taken during the whole development from the egg until the queen is mated, and

as all queens not up to the high standard required are destroyed, these queens can be absolutely relied on and will be replaced in the unlikely event of being unsatisfactory in any respect.

Four classes of Queen are offered:—

I. Virgin Queens produced under the best possible conditions emerging from cells placed in cages a few hours before. It is well known that queens which emerge from caged cells are not of so high quality as those emerging in nuclei. Virgin queens can therefore be supplied from nuclei at a slight extra charge.

II. Untested mated Queens, produced in very strong stocks and allowed to emerge in the mating nuclei. These are of very high quality.

III. Select Untested Queens: selected from the above for color, size, and laying capacity in the small mating nuclei. These queens are very much superior to those usually obtained in this country or from abroad.

IV. Select Tested Queens suitable for use as Breeders.

These are carefully selected throughout the whole development from the grafted queen cups and only exceptionally fine queen cells are set aside for these queens. The cells are placed in strong nuclei on standard frames a few hours before the queens emerge. The young queens are carefully examined for size and color as soon as they emerge, and are allowed to remain in the nuclei, after mating, until the color of their progeny indicates purity of mating. This necessitates the keeping of these choice queens in the mating nuclei for a period of 21 to 30 days, and during this time the evenness of egg laying and prolificacy of the queens are carefully tested.

After this careful selection the queens shipped as Breeders can be relied on as the best it is possible to obtain from any source, and they are now generally recognised as such. Before shipment of these queens, the nuclei containing them are gradually reduced in size, so as to slowly lessen the egg laying of the queens and ensure safety in travelling.

TRAVELLING CAGES, &c.

The travelling cages used for shipment of the Untested and Select Untested Queens are of the American long distance type, being very much larger than the cage ordinarily employed in this country. Breeding queens are sent out in specially made export cages imported from the U. S. A.

The candy used in all cages does not contain honey as an ingredient: danger from foul brood, nosema apis, &c., is thus avoided. As this candy is unobtainable in this country, it is imported from the A. I. Root Co., of Medina, Ohio.

Special labels have been designed to render the packages plainly distinguishable in the post in order to avoid rough handling in transit.

Safe delivery is therefore guaranteed of all queens sent by post, and in case of damage in any way replacement will be made on return of the cage unopened.

All queens are given a consecutive registered number and full details kept of their work before shipment. It is therefore possible to supply unrelated queens at any time afterwards when required.

NUCLEI.

Nuclei can be supplied on three or four frames from June 7th. These nuclei must not be confused with the nuclei usually sent out, as they are in reality strong stocks condensed to small bulk for shipment..

These nuclei—known as honey production stocks—consist of three or four frames of brood in an advanced stage of development, well covered by young bees. The young bees emerging from the brood within 12/14 days, will form a very strong stock which will build up with extreme rapidity owing to the very high percentage of young bees present in the colony. It is usually possible to super these stocks, supplied on four frames, within 14 to 21 days of delivery, and to obtain a fair surplus the same year if delivery is made in June.

Before shipment of nuclei a sample of the bees is examined under the microscope in order to ensure freedom from Acarine disease. The stocks can therefore be relied on as free from disease when delivered, and when rationally managed will remain free from infection. In the rare cases where infection is found in these strains it usually exists in the initial stages and can be eliminated by intensive brood production. In the case of Native bees this is generally impossible.

Where required, all nuclei are guaranteed to remain free from Acarine disease within six months of delivery, provided the advised conditions of management are carried out. In the event of infection appearing in these cases, the nucleus will be replaced free of charge by another nucleus of the same grade and size as originally purchased.

ACARINE DISEASE.

Prior to the important discovery of *Tarsonemus woodi* by Dr. Rennie in 1920, the whole subject of Isle of Wight disease was involved in mystery: owing to lack of knowledge as to the cause of the complaint treatment was practically hopeless, and in the light of recent knowledge the methods formerly recommended for the alleviation of the complaint are shewn to be worthless.

The disease is caused by the parasite breeding in and living at the expense of the tissues of the Respiratory system of the bee, and the cause is confined entirely to this portion of the bee's anatomy. Medicinal treatment is therefore of no avail unless the drug can be introduced into these organs. Though attempts have been made to discover a suitable fumigant, the results reported up to the present time are not promising, though it is probable that successful medicinal treatment will follow this course.

Attempts to find immune varieties of bee have not been successful and there is no possibility of success in this direction. Experiments conducted in 1921 have shewn that all the well-known strains can be infected with the disease, and that where conditions are favorable for the increase of the parasite within the colony, the disease will reach the same degree of severity with all strains.

While some strains—owing to their general characteristics, and not owing to greater resistance of individual bees to the parasite—are found to be fairly immune to attack when managed in a rational manner, it must be recognised that no strain is truly immune, and that comparative immunity is almost entirely a matter of management.

Where the older methods of bee-keeping obtain disease must be expected, but with Rational management the modern strains of American Italian bees can be kept free from the complaint.

During the course of the investigation referred to—the results of which are published in *Bee World, December, 1921*—it was observed:—

- (i.) That British blacks, or Natives, and dark hybrid bees are generally found to be infected with the disease, and the infection to be in a well advanced stage in the majority of cases. That when these strains become infected treatment is usually found ineffective owing to the low prolificacy of these queens compared with those of high grade Italian strains.
- (ii.) That while stocks of Italian strains of bee headed by high grade and prolific queens are usually found to be free from infection, some cases of infection are found usually in the initial stages. In these cases the cause is generally to be found on examination of the previous history of the colony.
- (iii.) That the degree of infection found is dependent on the age of the adult bees of the colony.
- (iv.) That measures which increase the age of the bees of a colony, such as the removal of brood, the use of non-prolific queens, prolonged queenlessness, &c., render the colony open to attack by the disease, and when infection has occurred render the rapid spread of infection certain.
- (v.) That *vice versa*, measures which decrease the average age of the bees of a colony, such as the addition of brood, stimulation for brood

production, and the use of high grade prolific queens render the colony practically immune to attack, or if carried out when infection is observed in its initial stages eliminate the disease.

PREVENTION OF THE DISEASE.

The method of prevention of attack by the disease, and of elimination of the complaint, is pointed out by these experiments, and the problem now resolves itself into the adoption of Rational methods of bee-keeping.

By the avoidance of the inbred and degenerate British Blacks and strains containing a considerable proportion of this blood, by the use of exceptionally prolific queens of vigorous American—Italian strains and by stimulation for brood production before and after the resting season of the year, the chance of infection is reduced to a minimum. As the robbing of stocks infected by the parasite is the chief immediate cause of infection, this should be prevented at all costs, by isolation of the diseased colonies, and by reducing the entrances as much as possible in spring and autumn. As the parasite can only exist in the trachea of the living bee, and dies within a very short time of the death of the host, no danger need be feared from Acarine disease when old combs from stocks which have died from the complaint are utilised—provided the combs are allowed to remain out of contact with bees for a fortnight. There is also no danger of infection as the result of robbery of hives which have perished from the disease some time previously.

ELIMINATION OF THE COMPLAINT.

By the use of a microscope it is a comparatively simple matter to detect the disease in the initial stages of infection, some weeks before the usual symptoms of Acarine disease are visible, and when discovered at this stage it is usually possible to eliminate the complaint during the working season. To make plain the rationale of the process it is necessary to explain the course of the disease within the trachea of an infected bee. Experiments carried out during the investigation referred to previously have shewn, that young bees emerging from brood in an

infected stock, in the final stages of the disease, may become infected by the female parasite at the age of six days, and that the second generation appears twelve to fourteen days later. As migration of the parasites does not occur to any serious extent until the trachea becomes congested, and as this will not occur within 14 days of the hatching of the second generation of parasites, the danger of serious migration will not arise until say 35 days have elapsed since the original infection. That is to say that in the case of a stock of which only a low percentage of its members are infected the spread of the disease within the stock will not become serious until the bees originally infected have reached the age of 5 weeks.

If these infected bees, are removed from the sphere of action before they attain this age, the disease will not increase within the colony, but will gradually diminish and finally disappear.

The main object of the method of treatment is therefore the elimination of the older members of the infected colony: this can be carried out in two ways:—

- (1). By wholesale isolation of these bees by artificial swarming and collection of the adult bees on the old stand.
- (2). By so greatly increasing the work of these adults as to appreciably shorten their lives. This is best effected by intensive brood production stimulated by feeding, and by the addition of "hatching" brood from other colonies, thus increasing the nurse bees of the treated colony out of all proportion, and consequent stimulation of the queen.

A combination of both methods is frequently advisable in cases where the infection has advanced beyond the initial stages, and has so far developed that the second generation of parasites are found in the trachea.

It is extremely difficult to diagnose the complaint from symptoms, especially during the earlier stages of the disease, but any gradual change in the character or manner of the colony should be viewed with suspicion. Spring

dwindling, slowness in building up, and change in temper are frequently indicative of disease, but cannot be relied on as diagnostic symptoms. The only reliable and accurate diagnosis possible is the examination of a number of the foraging bees under the microscope, and this should be carried out by all modern apiarists from time to time.

PREPARATIONS FOR WINTER.

As the critical period of the year as regards Acarine disease is during the winter months, when owing to lack of foraging, and the practical absence of brood production, the average age of the bees composing the colonies becomes high, and infection, where present, spreads with extreme rapidity, it is necessary to prepare for this period some months in advance, and to ensure the absence of infection within the colony before the advent of winter.

In order to carry out this programme efficiently, the treatment should commence immediately after the termination of the honey flow of the district.

Where increase is desired the stocks should be divided by artificial swarming, and collection of the adult bees with the old queen on the original stand. This colony is stimulated for brood production and when established is re-queened by a young and vigorous mated queen of the selected strain.

The young bees on the new stand should be re-queened as soon as possible, by the introduction of a similar queen, and stimulated for brood production as before. Stimulation for the production of brood should continue in all cases until the first or second week in September, when rapid feeding should commence, in order to provide the stores necessary for the winter months.

Where increase is not desired, the original stock should be re-queened if free from disease, but where infection is found an artificial swarm should be made, and the adult bees collected on the old position utilised for the production of brood to be given to the main colony, which has been moved to the new position. In this case the old queen should be allowed to remain with the adult bees.

Annual re-queening is an absolute essential, as it is extremely difficult to stimulate an old queen of the previous year, to the extent required.

SPRING TREATMENT.

Where the winter has been mild—as experienced during recent years—it is advisable to place a cake of candy on the top of the frames in February, as this is a great stimulant at this period, and generally results in the very early production of brood.

As soon as pollen is carried into the hive in quantity, the quilts may be raised on a warm day, and some of the outer combs of food uncapped without causing undue disturbance of the bees. If short of food, this may be given as candy, or as syrup by means of a brood nest feeder. The uncapping of the food combs should be gradually extended, from time to time, until all combs containing food have been treated in this way, with the exception of those containing brood.

The object of this treatment is the utilisation of the stores of the colony before the spring feeding commences, so as to prevent the filling of the combs with food, and the consequent limitation of the brood space.

When all food combs have been treated as advised the spring feeding should commence and the stock will rapidly build up, new frames being given as required until the stock covers 20 brood frames by the first or second week in May.

When this stage is reached the Demaree method of swarm control should be practised, the queen being confined to the lower brood chamber, by means of a wire queen excluder, and kept supplied with egg laying space, by interchange of combs from above with those down below.

As swarming can be entirely prevented by this method, the yields of honey are very much larger than generally obtained, as the stocks can be worked of very much greater strength.

GENERAL.

The syrup used for winter feeding is of the strength usually recommended for this purpose in the text books, but the addition of one of the advertised antiseptics—preferably Yadil—is advisable as a preventive of foul brood, nosema apis and mildew.

In spring feeding the use of antiseptics is not recommended, owing to the danger of this being transferred to the honey comb.

It will be noted that the use of candy is advised during the spring, but except in cases of extreme urgency, should not be given as winter stores. Candy is not a suitable winter food for bees, as it is apt to become moist during the cold season of the year and to ferment and cause dysentery.

GUARANTEE AGAINST ACARINE DISEASE.

Before shipment, all nuclei are microscopically examined for the parasites causing Acarine disease and can be relied on as absolutely free from infection. In the unlikely event of infection occurring within 6 months of delivery, the nucleus will be replaced free of charge by a nucleus of similar size to the one originally supplied, provided the following conditions have been observed:—

- (1). Nuclei must be stimulated for brood production until well established on 9 or 10 frames.
- (2). Swarming must be prevented by the adoption of the Demaree system, or other similar methods. Where swarming occurs, resulting in the isolation of the adult bees of the colony, the guarantee does not apply to the swarm, but is transferred to the original stock on the old stand, provided this is given a young laying queen of the same strain within 14 days.
- (3). Immediately after the honey flow the original stock must be re-queened, and must not remain without a laying queen for a period exceeding 10 days, and the stock must be stimulated for brood production at this time. Where increase is desired the guarantee does not apply to the

colony containing the adult bees of the original colony, but as, in the case of swarms, to the original colony consisting of young bees on the new stand.

- (4). Samples of the adult foraging bees must be sent for examination when required, and in case of suspected disease a sample must be sent to an independent microscopist whose decision shall be taken as final.
- (5). This guarantee applies to Acarine disease only—formerly known as I. O. W. disease—and the presence of *Tarsonemus woodi* in the trachea of the suspected bees shall be taken as proof of infection.

Price List of Queens and Nuclei.

SEASON 1922.

QUEENS. Delivery from June 1st.

Young Queens raised from No. 1 Breeder (J. M. Davis Queen by Penna Drone) and No. 2 Breeder (Pure Penna Strain) can be supplied at any time during the season.

Young Queens of Ben Davis golden strain, and Jay Smith three-banded strain can be supplied if ordered before May 1st.

VIRGIN QUEENS: hatched in cages, 6/-; hatched in nuclei, 7/6.

MATED QUEENS: untested, 12/6; select untested, 15/-; select tested breeders, 25/-.

Delivery strictly in rotation, unless orders are placed one month in advance, except under special circumstances.

Discounts: 5 per cent. to members of the Apis Club; 1/- per fertile queen on orders placed before April 1st; 1/- per fertile queen if ordered in lots of 6.

NUCLEI. Delivery from June 7th.

These consist of sheets of advanced brood well covered by young bees.

Quoted without queens. Cost of queen selected to be added to cost of nucleus.

Three frames of advanced brood well covered by bees, £3 10s. od.

Four frames of advanced brood well covered by bees, £4 10s. od.

Carriage paid. 10/- deposit required on travelling box, to be returned on safe receipt of box within 10 days of shipment of nucleus.

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